

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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In re Patent Application of:  
Archie W. Garner et al.

Application No.: 10/521,225

Confirmation No.: 7214

Filed: July 6, 2005

Art Unit: 1711

For: Urethane Acrylate Gel Coat  
Resin and Method of Making

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Examiner: Benjamin Gillespie

**APPEAL BRIEF**

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

This Appeal Brief is submitted in accordance with MPEP §1205.02 to support the Notice of Appeal filed in this application on October 30, 2009. This Appeal Brief was originally filed February 16, 2010, accompanied by the fee for filing an Appeal Brief under 37 C.F.R. §1.17(b) and a two-month extension of time under 37 C.F.R. §1.136(a).

Accordingly, this Appeal Brief was timely filed and no further fees are believed due. This Appeal Brief is submitted in Response to a Notification of Non-Compliant Appeal Brief dated March 11, 2010.

Any additional required fee may be charged, or any overpayment credited, to Deposit Account No. 13-2855.

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### **III. STATEMENT OF THE REAL PARTY IN INTEREST**

The real party in interest in this appeal is Valspar Sourcing, Inc. (Valspar), a wholly owned subsidiary of The Valspar Corporation, Minneapolis, Minnesota. Valspar Sourcing, Inc. is the assignee of the entire right, title, and interest to the above-identified patent application. The assignment was recorded in the United States Patent and Trademark Office ("USPTO") at Reel 16885, Frame 0691 on August 15, 2005, which constitutes the entire chain of title from the inventors to Valspar.

**IV. RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences known to appellants, appellants' legal representative, or the assignee which will directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

**V. STATUS OF CLAIMS**

**A. HISTORY**

This application was originally filed with claims 1-25. Claims 26 and 27 were added to the application in Amendment "C", filed October 22, 2008.

**B. CURRENT STATUS OF CLAIMS**

Claims cancelled: 4.

Claims withdrawn from consideration but not cancelled: None.

Claims pending: 1-3 and 5-27.

Claims allowed: None.

Claims rejected: 1-3 and 5-27.

**C. CLAIMS ON APPEAL**

The claims on appeal are claims 1-3 and 5-27.

**VI. STATUS OF AMENDMENTS**

Appellants filed a response to the non-final Office Action of December 16, 2008 on April 2, 2009. The amendment was entered, and a final rejection was issued in the Office Action of July 2, 2009. Accordingly, appellants understand that the current form of the claims are represented by the Response to Office Action, filed April 2, 2009, and as reproduced in the Claims Appendix below.

## VII. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter relates to a urethane acrylate gel coat resin (claims 1-3, 5-15, and 26), a gel coat composition (claims 16-18), a gel coat (claims 19 and 20), an article of manufacture (claim 21), and methods of preparing a urethane acrylate gel coat resin (claims 22-25 and 27). Application specification page 5, lines 14 through page 6, line 8; page 14, lines 8-28; page 18, line 8 through page 19, line 8; and page 22, lines 1-15. The inventors have found that the claimed urethane acrylate gel coat resins demonstrate weatherability, stability, high gloss, consistent color over extended time periods, gloss retention, hardness, durability, good handling properties, and hydrolysis resistance (specification, page 4, lines 13-16, and page 6, lines 3-8).

The features of the present invention are clearly set forth in independent claims 1 and 22, wherein a urethane acrylate gel coat resin is provided by reacting three components together, wherein the reaction mixture is formed in a specifically claimed sequence:

Table 1	
Component	Type
A	a branched aliphatic hydroxy-terminated oligoester
B	a diisocyanate
C	a hydroxyalkyl (meth)acrylate

The urethane acrylate gel coat of claims 1 and 22 comprises a statistical mixture of compounds having schematic structures such as:

Table 2
C-B-C
$\begin{array}{c} \text{B-C} \\   \\ \text{C-B-A-B-C} \end{array}$
$\begin{array}{c} \text{B-C} \\   \\ \text{C-B-A-B-A-B-C} \\   \\ \text{B-C} \end{array}$
etc.

wherein A is the branched oligoester, B is the diisocyanate, and C is the hydroxyalkyl (meth)acrylate.

The claimed urethane acrylate gel coat resin of claim 1 is the reaction products of a reaction mixture comprising:

(a) a branched aliphatic hydroxy-terminated oligoester having weight average molecular weight of about 200 to about 4000, wherein the branched oligoester is a reaction product of

(i) one or more saturated diols;

(ii) one or more saturated triols, and

(iii) one or more saturated dicarboxylic acids, or one or more aliphatic unsaturated dicarboxylic acids, or one or more saturated dicarboxylic acid anhydrides, or one or more aliphatic unsaturated dicarboxylic acid anhydrides, or mixtures thereof (specification, page 8, line 8 through page 10, line 27),

wherein the oligoester comprises up to 5 mole % of the one or more saturated triols (specification, page 9, lines 27-30);

(b) a diisocyanate (specification, page 11, line 1 through page 12, line 10);  
and

(c) a hydroxyalkyl (meth)acrylate (specification, page 12, line 11 through page 13, line 19),

wherein the reaction mixture is formed by adding the diisocyanate to a blend of the oligoester and hydroxyalkyl (meth) acrylate (specification, page 14, lines 21-28).

The method of preparing the claimed urethane acrylate gel coat is more particularly recited in independent claim 22. In particular, the method of preparing a urethane acrylate gel coat resin comprises the steps of



(a) preparing a branched hydroxy-terminated oligoester having a weight average molecular weight of about 200 to about 4000 by reacting

(i) one or more saturated diols;

(ii) one or more saturated triols, and

(iii) one or more saturated dicarboxylic acids, or one or more aliphatic unsaturated dicarboxylic acids, or one or more saturated dicarboxylic acid anhydrides, or one or more aliphatic unsaturated dicarboxylic acid anhydrides, or mixtures thereof,

wherein the oligoester comprises up to 5 mole % of the one or more saturated triol (specification, page 14, lines 8-20);

(b) adding a hydroxyalkyl (meth)acrylate to the oligoester of step (a) to form a prereaction mixture;

(c) then adding a diisocyanate to the prereaction mixture of step (b) to form a reaction mixture (specification page 14, lines 21-28); and

(d) maintaining the reaction mixture of step (c) at a sufficient temperature for a sufficient time such that equivalents of free isocyanate groups are present at less than 0.3% of the isocyanate groups added in step (c) to yield the urethane acrylate gel coat resin (specification, page 17, lines 22-25).

## **VIII. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

Whether claims 26 and 27 comply with the written description requirement of 35 U.S.C. §112, first paragraph.

Whether claims 1-3, 5-12, 16-21, and 26 are anticipated under 35 U.S.C. §102(b) by Tomotsugu et al. U.S. Patent No. 5,338,613 ('613).

Whether claim 26 would have been obvious under 35 U.S.C. §103 over the '613 patent.

Whether claims 1-3, 4-12, and 16-27 would have been obvious under 35 U.S.C. §103 over the '613 patent in view of Bristowe et al. U.S. Patent No. 4,213,837 ('837).

Whether claims 1-3, 5-21, and 26 would have been obvious under 35 U.S.C. §103 over Sirkoch et al. U.S. Patent No. 4,745,003 ('003).

Whether claims 1-3 and 5-27 would have been obvious under 35 U.S.C. §103 over the '003 patent in view of the '837 patent.

For purposes of the issues on appeal, claims 2-3, 5-21, and 26 are grouped and argued with claim 1.

Claims 23-25 and 27 are grouped with claim 22 to form a second group that is separately argued.

## IX. ARGUMENT

### A. INTRODUCTION

Appellants submit that the rejections issued in the final Office Action are in error, and that the present application is in condition for allowance. Appellants respectfully request the Board to review and reverse each of the rejections issued in the final Office Action.

### B. REJECTION OF CLAIMS 26 AND 27 UNDER 35 U.S.C. §112, ¶1 FOR FAILING TO COMPLY WITH THE WRITTEN DESCRIPTION REQUIREMENT

#### 1. The lower limit of 1.4 mole% is supported for the range.

Claims 26 and 27 recite that the oligoester component A of the gel coat resin comprises about 1.4 mole % up to 5 mole % of one or more saturated triols. These claims stand rejected under 35 U.S.C. §112, ¶1 for failing to comply with the written description requirement based on the assertion that the lower limit for the amount of triol in the oligoester component A of the urethane acrylate gel coat resin, i.e., 1.4 mole%, was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors had possession of the claimed invention. Applicants respectfully traverse this rejection.

The examiner admits that the upper limit of 5 mole % is supported at page 9, lines 27-28 of the specification (Office Action of July 2, 2009, page 2). The examiner, however, incorrectly contends that Example 3 of the specification, which contains 1.4 mole% triol does not provide support for the lower limit of the claimed range, but only for the single mole % of 1.4. At page 5 of the Office Action of July 2, 2009, the examiner supports this rejection under 35 U.S.C. §112, first paragraph, stating:

"12. While the examiner agrees that the numerical value "1.4" falls *between* 0 and 5, it is important to note that "1.4" was never specifically disclosed as being a suitable the [sic] **lower end point** for the triol mol%. The fact that the specific value of 1.4 mol% is exemplified does not establish that applicants previously envisaged **lower end points of 1.4 mol% (emphasis added)**.";

Appellants respectfully submit that the 1.4 mole % up to 5 mole % range is supported by the specification at page 9, lines 27-29 (which discloses that the oligoesters comprises a small amount of a triol, e.g., up to 5 mole %) and at page 17, lines 5-9 (i.e., Example 3), which describes a composition having 1.4 mole% triol (reciting 94.8 g (0.80

moles) 1,6-hexanediol, 86.8 g (0.60 moles) adipic acid, and 2.6 g (0.02 moles) TMP (trimethylolpropane)). To satisfy the written description requirement of 35 U.S.C., ¶1, a patent specification must describe the claimed invention in sufficient detail such that a person having ordinary skill in the art, as of the specification's effective filing date, could have reasonably concluded that the patent applicants had possession of the claimed invention. *See, e.g., Moba, B.V. v. Diamond Automation, Inc.*, 325 F.3d 1306, 1319 (Fed. Cir. 2003). While there is no *in haec verba* requirement, amended claims must be supported in the specification through express, implicit, or inherent disclosure. The fundamental inquiry is whether the filed specification conveys with reasonable clarity to those having ordinary skill in the art that the applicants were in possession of the invention as now claimed. *See, e.g., Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991). Possession may also be shown by describing an actual reduction. *See, e.g., M.P.E.P. §2163 (I).*

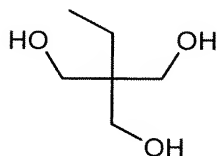
Appellants submit that their possession of both endpoints of the presently recited range and a third point between said endpoints clearly demonstrates their possession of the presently recited mol % range. The Board is directed to the discussion of *In re Wertheim*, 541 F.2d 257 (CCPA 1976) in MPEP §2163 stating that an originally disclosed range of 25%-60%, and a specific example of 36%, supported a claim amendment of between 35% and 60%. This is exactly the fact situation in the present application. The Board also is directed to *Kolmes v. World Fiber Corp.*, 41 USPQ2d (Fed Cir 1997), which rejected a contention of new matter because of a claim limitation of 8-12 turns, when the original specification disclosed a range of 4-12 turns and specifically 8 turns as a preferred embodiment. The court found that the latter filed claim limitation of 8-12 turns was supported by the specification and that claims to subject matter in the specification is not new matter.

**2. Applicants' specification supports triols in general, not just a single species.**

The examiner further contends that, even if Example 3 provides sufficient support for a triol lower limit of 1.4 mol%, then Example 3 provides support only for trimethylolpropane (TMP) as the triol (Office Action, July 2, 2009, page 2). At page 5 of the Office Action of July 2, 2009, the examiner supports this rejection under 35 U.S.C. §112, first paragraph, stating:

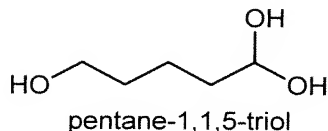
"14. While the examiner agrees that the term "triol" is commonly known within the art – i.e., low molecular weight compound having three hydroxyl

groups – it should be noted that the presence of three hydroxyl groups does *not* establish all triols will have the same properties in a given reaction system or result in analogous products. For example trimethyl propane has the structure:



trimethylol propane

15. Wherein each hydroxyl group is separated by at least three carbons and [sic] there are no secondary hydroxyl groups. However, pentane-1,1,5-triol, which has the structure:



pentane-1,1,5-triol

16. Has two secondary hydroxyl groups that are separated by a single carbon atom while the third hydroxyl group is separated by five carbon atoms. Based on the an [sic] asymmetrical geometry and the fact that pentane-1,1,5-triol has hydroxyl groups with different reactivities, the resulting reaction system/polymer would be distinct from that based solely on glycerin. Therefore, without support from the specification, one of ordinary skill would not blindly interchange *any triol* for trimethylolpropane based solely on the fact that both compounds contain three hydroxyl groups. With this understanding, the position is maintained that applicants' examples are not sufficient to support the breadth of claims 26 and 27."

The examiner's reasoning is in error, both in law and fact.

Persons skilled in the art are well aware of the definition of triol and the identity of triols. Appellants' specification is not limited to trimethylolpropane, but clearly recites "triols" in the specification, stating that glycerin and trimethylolpropane are examples of suitable triols (page 10, lines 1 and 2). Applicants also recited "triol" in the *original claims* clearly showing possession of the claimed invention at the time of filing the application.

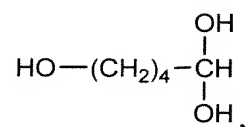
The examiner again is directed to the discussion of *In re Wertheim* in MPEP §2163 wherein, with respect to original claims, there is a strong presumption an adequate written description to the claimed invention is present when the application is filed, and that it is the burden of the Patent Office to present evidence or reasons why a skilled person would not recognize a disclosure of the invention defined by the claims. The term "triol" was used

in the original specification and claims, suitable triols were listed in the specification, and an example using a specific triol was presented. It is also well known that a specification need not include, and preferably excludes, that which is well known in the art. Hence an even more exhaustive listing or exemplification of triols in the specification is not necessary.

Moreover, it is also well settled law that an example is not even required to comply with 35 U.S.C. §112. In the present case, an example using a particular triol was provided, and other triols known in the art can be substituted for the triol of Example 3. Accordingly, the example provided in the specification provides sufficient guidance for persons skilled in the art to prepare a triol-containing oligoester, and the specification demonstrates that inventors had possession of the claimed invention at the time of filing the application.

The examiner's argument that the structure of TMP is somehow different from other triols and that a person skilled in the art would not substitute any other triol for TMP is totally incorrect. In the preparation of Applicants' claimed oligoester, the selected triol undergoes an esterification reaction with a dicarboxylic acid. All three types of hydroxy groups (primary, secondary, tertiary) are well known in the art to undergo esterification reactions with a carboxylic acid. Accordingly, one skilled in the art would expect that any triol could be substituted for TMP and a branched oligoester would result.

In his argument, the examiner compares TMP (3 primary OH groups) to pentane-1,1,5-triol, i.e.



as purportedly having two secondary hydroxyl groups, thereby having a different reactivity from TMP. This argument falls on its face. First, pentane-1,1,5-triol is not actually a triol, but is disguised aldehyde, i.e., an acetal (5-hydroxypentanal), well-known and easily found in the literature, i.e., CAS Registry No. 4221-03-8.

Therefore, a person skilled in the art would not select pentane-1,1,5-triol because it is unstable, and in fact does not exist except for possibly small amounts in equilibrium with 5-hydroxypentanal.

Secondly, the specification itself discloses a suitable triol different from TMP (glycerol) at page 10, line 1. Glycerol possesses a secondary –OH group, and regardless of

whether a triol has primary and/or secondary –OH groups, the triol serves its intended purpose, i.e., to introduce a small amount of branching into the oligoester. Both primary and secondary alcohols are well known to participate in esterification reactions, and triols having *each* type are disclosed in the specification

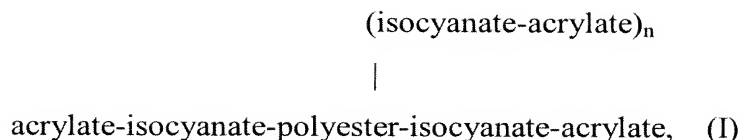
Therefore, considering the present specification as a whole, including the information disclosed in Example 3, appellants have adequately informed those skilled in the art that the claimed triol can be present in an amount of "about 1.4 mol% up to 5 mol%." The final rejection of claims 26 and 27 under 35 U.S.C. §112, first paragraph, for failure to comply with the written description requirement should be reversed.

**C. REJECTION OF CLAIMS 1-3, 5-12, 16-21, AND 26 UNDER 35 U.S.C. §102(b) AS BEING ANTICIPATED BY TOMOTSUGU ET AL. U.S. PATENT NO. 5,338,613 ('613) AND THE REJECTION OF CLAIM 26 AS BEING OBVIOUS OVER THE '613 PATENT**

Urethane acrylate gel coat resin claims 1-3, 5-12, 16-21, and 26 stand rejected under 35 U.S.C. §102(b) as being anticipated by the '613 patent based on an assertion that the '613 patent discloses a urethane acrylate resin comprising the reaction product of a hydroxyl-functional polyester, polyisocyanate, and 2-hydroxyethyl (meth)acrylate. Claim 26 also stands rejected as being obvious under 35 U.S.C. §103 over the '613 patent.

**1. Disclosure of the '613 Patent**

The '613 patent discloses a photocurable resin composition containing a urethane acrylate resin. The '613 patent discloses that "[t]wo processes are available for synthesizing a urethane acrylate resin" (column 2, lines 64-65). In one process, a urethane acrylate resin is prepared by first providing a polyester ('613 patent, column 2, lines 20-63), which then is reacted with an aliphatic or alicyclic polyisocyanate "to prepare an isocyanate-terminated urethane prepolymer" ('613 patent, column 2, line 66 through column 3, line 9). *Then*, "by utilizing the residual isocyanate groups of the urethane prepolymer", a hydroxyalkyl (meth)acrylate is added ('613 patent, column 3, lines 9-13). An alternative method of preparing the urethane acrylate resin is disclosed at column 3, lines 14-18 of the '613 patent, i.e., addition of 2-isocyanatoethyl (meth)acrylate to the terminal hydroxyl group of the polyester. By *either* method, the '613 patent teaches a urethane acrylate resin having the following general structure:



wherein n is 0 if triols and polyols are omitted and n is 1 or greater if a triol or a polyol is present.

It is important to note that adding the polyester to the isocyanate leads to a reaction wherein the isocyanate is positioned at the terminal end of the polyester. The subsequent addition of the acrylate caps the isocyanate groups to provide terminal acrylate groups. This order of addition of reactants is important because the order of addition can lead to different reaction products. Also see Production Example 1 ('613 patent, column 5, lines 14-39) for the order of addition disclosed by the cited reference.

## 2. Rejection of Claims 1-3, 5-12, 16-21, and 26 as Anticipated by the '613 Patent

Appellants submit that claims 1-3, 5-12, 16-21, and 26 are not anticipated by the '613 patent, and the '613 patent fails to disclose the claimed sequence for forming the reaction mixture, which in turn leads to a different urethane acrylate gel coat resin.

In contrast to the '613 patent, the present claims recite a polyester urethane acrylate reaction mixture that is prepared by a substantially different method, and which provides different reaction products than the method disclosed in the '613 patents, even *if* the *same* reactants are used. As noted in the summary, the urethane acrylate gel coat of claims 1 and 22 provide a *statistical mixture* of compounds having schematic structures such as:

Table 3
C-B-C
$  \begin{array}{c}  \text{B}-\text{C} \\    \\  \text{C}-\text{B}-\text{A}-\text{B}-\text{C}  \end{array}  $
$  \begin{array}{c}  \text{B}-\text{C} \\    \\  \text{C}-\text{B}-\text{A}-\text{B}-\text{A}-\text{B}-\text{C} \\    \\  \text{B}-\text{C}  \end{array}  $
etc.

wherein A is the branched oligoester, B is the diisocyanate, and C is the hydroxyalkyl (meth)acrylate.



The '613 patent discloses a polyurethane acrylate resin made by preparing an isocyanate-terminated polyurethane prepolymer, *then* reacting the prepolymer with a hydroxyalkyl acrylate to form the urethane resin. Unlike the compositions of the present invention, the compositions of the '613 patent should contain no acrylate-isocyanate-acrylate compounds in the reacted mixture (i.e., no C-B-C compounds). For this reason alone, a difference exists between the instant claims and the '613 patent such that a rejection under 35 U.S.C. §102(b) cannot be maintained.

Notably, the urethane acrylate gel coat resin recited in the present claims is *necessarily* different from the urethane acrylate resin of the '613 patent because of the difference in sequence in reacting the ingredients. Each reference discloses an oligoester (component A), a diisocyanate (component B), and a hydroxyalkyl (meth)acrylate (component C). Component B is capable of reacting with *each* of components A and C. In the '613 patent, components A and B first are *reacted* such that unreacted isocyanate groups remain. The polyurethane prepolymer then is capped with component C. The resulting urethane acrylate resin has the structure (I), above, and no C-B-C moieties are provided.

The '613 patent therefore fails to teach or suggest every element recited in the claims, i.e., the order of addition that leads to a different reaction product. The '613 patent also provides no apparent reason for a person skilled in the art to modify teachings of the '613 patent and change the order of addition of ingredients to provide a different reaction product. While some examiners have taken the position that a product-by-process claim, like claim 1, is not patentable over prior art disclosing compositions made by a different process and having the *same* structure, it is axiomatic that structure necessitated by process steps should be considered when assessing the patentability of product-by-process claims over the prior art. *In re Garnero*, see MPEP §2113.

In summary, the '613 patent does not disclose each and every feature recited in the claims, and appellants submit that the rejection of claims 1-3, 5-12, 16-21, and 26 under 35 U.S.C. §102(b) should be reversed because the '613 patent does not show the identical invention as claimed.

### **3. Non-obviousness of Claims 1-3, 5-12, 16-21, and 26**

The '613 patent also fails to render claims 1-3, 5-12, 16-21, and 26 obvious under 35 U.S.C. §103.

As discussed above, the '613 patent teaches *two*, and only two, processes for preparing a urethane acrylate resin. The '613 patent fails to suggest any alternative method of preparing a gel coat resin by stating "[T]wo processes are available for synthesizing a urethane acrylate resin using the above-identified polyester" (column 2, lines 64-66). The '613 patent, therefore, clearly teaches a preparative specific urethane acrylate resin having the structure discussed above. The present claims recite a different urethane acrylate gel coat resin prepared by a different process.

The '613 patent specifically discloses the preparation of polyester, followed by a reaction with an excess amount of polyisocyanate to provide "an isocyanate-terminated urethane prepolymer" (column 3, lines 8-10). This reaction forms an isocyanate terminated polyester prepolymer, which *then* is reacted with 2-hydroxyethyl (meth)acrylate to position terminal unsaturated groups on the resin (column 3, lines 10-13) and form a urethane acrylate resin having the general structure (I) above. A second method of preparing a urethane acrylate resin of the '613 patent (column 3, lines 14-18) provides the same product as the first '613 patent method discussed above.

In contrast, the present claims recite a polyester urethane acrylate that is prepared by a substantially different method, which *cannot* provide the same reaction products as the method disclosed in the '613 patent, even *if* the *same* reactants are used. Present claim 1 recites that the gel coat resin comprises reaction products of a reaction mixture comprising components A, B and C. That is to say, the gel coat resin of claim 1 is formed when *all three* components are individually present in a reaction mixture. No reaction occurs when components A and C are blended. Only when component B is added, can component B react with components A and C simultaneously. It is this simultaneous reaction scheme that provides the statistical mixture of different resins. The resulting structure of the claimed resin therefore is different from the structured resin disclosed in the '613 patent.

A clear difference between the '613 patent and the present claims is the recited presence of component C in the reaction mixture *before* all of components A and B have reacted. The consequence is that the present reaction mixture will contain species that are reaction products of the isocyanate compound with the hydroxyalkyl acrylate, designated as C – B – C. Formation of such a reaction product is not possible in the method disclosed in the '613 patent.

In addition, the '613 patent provides no teaching or suggestion that the disclosed composition should be made by any other process. The '613 patent discloses no problems with the disclosed method or composition that would lead a person skilled in the art to alter the method or composition of the '613 patent and arrive at the presently claimed gel coat composition. There is simply no apparent reason provided in the teachings or suggestions of the '613 patent that would lead a person skilled in the art to modify the '613 patent and arrive at the presently claimed invention. Further, a person skilled in the art, after reading the '613, could not have reasonably predicted that the composition resulting from altering the reaction sequence would provide a urethane acrylate gel coat resin having the excellent properties exhibited by a claimed urethane acrylate gel coat composition.

For all of the reasons set forth above, appellants submit that claims 1-3, 5-12, 16-21, and 26, in addition to being not anticipated by the '613 patent, would not have been obvious to a person skilled in the art under 35 U.S.C. §103 over the '613 patent.

#### **4. Response to Examiner Arguments in the Office Action**

In the Office Action of July 2, 2009, at paragraph 19, page 6, the examiner admits that the '613 patent fails to teach the presently claimed product-by-process features, then goes on to state in paragraphs 20 and 21:

"20. With this understanding, said product-by-process fails to provide a patentable distinction over the prior art since applicants' current examples provide no inventive examples or comparative data showing how the claimed "adding the diisocyanate to a blend of the oligoester and hydroxyalkyl (meth)acrylate" results in the *alleged* mixture of branched and non-branched urethane acrylates. **The position that said product by process holds weight is unpersuasive because it has not been supported by any factual data and instead appears to be an unsubstantiated opinion (emphasis added).**

21. Furthermore, if applicants maintain that their examples are sufficient to establish patentable weight for the claimed product-by-process, it should be noted that examples 1 and 2 do not include triol, and example 3 fails to "[add] the diisocyanate to a blend of the oligoester and hydroxyalkyl(meth)acrylate" and instead adds the diisocyanate and acrylate at the same time –i.e. a different product-by-process than that recited in claim 1. Therefore, applicants' examples still fail to establish the claimed product-by-process is patentably distinct because they are not representative of the claimed limitations."

These contentions are erroneous. *All* of the examples in the specification are prepared by the process recited in the claims and include triol. Together with the entire

disclosure in the specification, the examples show how the present urethane acrylate gel coat resins are prepared.

With respect to the examiner's statement that there is only an *alleged* mixture of branched and non-branched urethane acrylates, it is submitted that both branched and non-branched urethane acrylates are *necessarily* present. The claimed oligoester component A is prepared from diols *and* triols, each of which have hydroxyl groups, that are reactive with a dicarboxylic acid. The resulting oligoester ester therefore *must be* branched. The examiner has provided no factual reasoning to support his unsubstantiated statements, which are contrary to elementary organic chemistry.

The examiner also attempts to support the obviousness rejection by contending that the specification examples are not representative of claimed features, i.e., Examples 1 and 2 do not contain a triol and Example 3 fails to add ingredients in the manner claimed.

Examples 1, 2, and 3 *each* disclose adding ingredients in the manner claimed. This is clear in Examples 1 and 2. The examiner contends that contrary to the claimed process step, Example 3 teaches adding the "diisocyanate and acrylate at the same time" as opposed to "adding the diisocyanate to a blend of the oligoester and hydroxyalkyl (meth)acrylate". This contention is incorrect.

Example 3 first discloses preparation of the oligoester, then goes on to state: "Next, DBTDL (0.31 wt. parts), 2,6-di-t-butyl-p-cresol (0.53 wt. parts), HEA (55.7 wt. parts), and IPDI (101.2 wt. parts) were added to the oligoester." This does not teach a simultaneous addition, as suggested by the examiner. Note, the preparation of an oligoester, addition of HEA, and the addition of IPDI. In addition, especially note that Example 3 states the "IPDI was added at a rate such that the exothermic reaction was maintained below 200°F", clearly showing an addition of the diisocyanate to a blend of the oligoester and HEA, as set forth throughout the specification and as claimed. A mixture of the oligoester and HEA is a prereaction mixture, and the two ingredients do not react with one another.

**D. REJECTION OF CLAIMS 1-3, 6-12, AND 16-27 UNDER 35 U.S.C. §103 AS BEING OBVIOUS OVER THE '613 PATENT IN VIEW OF BRISTOWE ET AL. U.S. PATENT NO. 4,213,837 ('837)**

**1. Disclosure of the '837 Patent**

The '837 patent is directed to a vinyl ester urethane prepared by reacting: (a) a polyoxyalkylene bisphenol A and a polycarboxylic acid or anhydride; (b) a polyfunctional isocyanate; and (c) a monohydroxyl-terminated ester of acrylic acid ('837 patent, abstract).

Component (a) is a linear molecule prepared from aromatic bisphenol-A reacted with an alkylene oxide (as set forth at column 3, line 17-37 of the '837 patent) and therefore contains no branching. In addition, component (a) has an aromatic character and is an ether, as opposed to an oligoester.

The '837 patent discloses three methods of preparing the vinyl ester urethane at column 5, line 48 through column 6, line 7, including the following:

"In a preferred blend technique the BAHPO is blended first with the hydroxyl-terminated ester of acrylic acid and subsequently, thereto the polyfunctional isocyanate is added to the blend. The BAHPO and hydroxyl-terminated ester of acrylic acid blend are first heated to a temperature of about 50°C. The polyfunctional isocyanate is added gradually over a period of about one hour while the reaction temperature is allowed to reach about 70° – 100° C."

This process is preferred because of a better control of exothermic reactions and the formation of by-products ('837 patent, column 6, lines 17-19).

**2. Rejection of Claims 1-3, 4-12, and 16-27 as Being Obvious Over the '613 Patent in View of the '837 Patent**

The patentability of claims 1-3, 4-12, and 16-27 over the '613 patent has been discussed above. The '837 patent fails to overcome the deficiencies of the '613 patent. The examiner relies upon the '613 patent for disclosing a urethane acrylate resin prepared from a hydroxy-functional polymer, a polyisocyanate, and a hydroxyalkyl (meth)acrylate. As discussed above, the '613 patent discloses two processes for synthesizing a urethane acrylate resin (column 2, lines 64-65). By *either* method, the '613 patent teaches a different urethane acrylate resin from the instantly claimed mixture.

The examiner then relies upon the '837 patent to support a contention of obviousness on the grounds that the '837 patent discloses three alternative methods of making urethane acrylates (column 5, line 48 through column 6, line 26), including a preferred

method that "allows for a better control of the exothermic reaction, and minimizes the formation of by-products". In this preferred method, an ether is blended with a hydroxyalkyl acrylate, forming an intermediate, and then reacted with a diisocyanate. The examiner then takes the '837 polyurethane resin and combines it with the '613 patent to suggest portions of the claimed invention. However, such a combination requires a hindsight analysis and overlooks particular teachings in the '837 patent that would discourage a person skilled in the art from making the combination. For example, the '837 patent discloses particular urethane resins having specific structures of aromatic polyoxyalkylene bisphenol A polyethers, and the like. The '837 patent also appears to be directed to UV curable resins rather than the thermally curable gel coat compositions of the present claims. These and other differences illustrate that a person of skill in the art would not be motivated to combine teachings in a way leading to the presently claimed invention.

The '837 patent teaches away from modifying its disclosure to arrive at the presently recited claims. Its teaching is expressly limited to the polyol disclosed:

"It has now been discovered that *certain* vinyl ester urethanes having a *specific* number oxyalkylene units and other *specific* limitations possess a combination of excellent properties...."  
(emphasis added)

col. 1, lines 58-62. Because the "excellent properties" result from "specific limitations" as described with respect to the polyol structure, a person of skill in the art would have no apparent reason to modify the '837 patent disclosure lest the excellent properties and advantages be lost.

As stated above, the '837 patent is directed to *aromatic* polyethers. The present claims, and the '613 patent, are directed to *aliphatic* polyesters. Therefore, contrary to a statement in an Office Action, a claimed urethane acrylate gel coat and a polymer of the '837 patent do not have "an analogous backbone architecture". Furthermore, the control of exotherms and avoidance of by-products referred to in the '837 patent is particularly relevant to aromatic polymers, and such a teaching is not necessarily extendable to aliphatic polymers. For example, it is well known that aliphatic hydroxy groups (e.g., alcohols) and aromatic hydroxy groups (e.g., phenols) can undergo different reactions and via different mechanisms, and can undergo similar reactions differently.

In summary, the '837 patent is directed to linear, aromatic polymers having ether linkages, and methods of preparing aromatic polymers are not necessarily the same as

methods of the preparing aliphatic polymers having ester linkages. Moreover, the '837 patent further teaches that different processes for preparing a polymer results in a *different* reaction product, which contradicts a contention made by the Examiner that the order of addition of reactants does not yield different product mixtures. The '837 patent therefore fails to cure the deficiencies of the primary '613 patent.

For all the reasons set forth above, appellants submit that the rejection of claims 1-3, 4-12, and 16-27 as being obvious under 35 U.S.C. §103 over a combination of the '613 patent in view of the '837 patent should be reversed.

### **3. Response to Examiner's Arguments in the Office Action**

In the Office Action of July 2, 2009, page 8, paragraph 23, the examiner asserts that "one would be motivated to control the amount of heat released during the formation of urethane acrylate in order to prevent any premature consumption of acrylate groups." This statement is incorrect.

First, acrylate groups are not consumed in the preparation of the instantly claimed urethane acrylate. It is the hydroxy group of the hydroxyalkyl (meth)acrylate group that is consumed. The acrylate group itself, e.g.,  $(-C(=O)CH=CH_2)$  must remain for eventual curing of the gel coat composition.

Further, a premature consumption of the hydroxy group of the hydroxyalkyl (meth)acrylate *cannot* occur. The hydroxyalkyl (meth)acrylate and oligoester are preblended (see claim 22), such the hydroxy groups of each ingredient are available to react with the diisocyanate that then is added to the preblend. The diisocyanate is *intended* to react with the hydroxy groups of *both* ingredients, and to an extent such that less than 0.3% of the isocyanate groups remain, as claimed.

## **E. REJECTION OF CLAIMS 1-3, 5-21, AND 26 AS BEING OBVIOUS OVER SIRKOCH ET AL. U.S. PATENT NO. 4,745,003 ('003)**

### **1. Disclosure of the '003 Patent**

The '003 patent discloses a liquid coating composition curable by exposure to ultraviolet (UV) light. The composition can contain an ethylenically unsaturated urethane ('003 patent, column 3, lines 31-34).

The ethyleneically unsaturated urethanes

"may be prepared, for example, by reacting polyols such as simple diols, triols and higher hydric alcohols, polyester polyols, polyether polyols, acryl polyols, epoxypolyols, or urethane polyols with polyisocyanates containing ethylenic unsaturation; by reacting the isocyanate groups of urethane resins with unsaturated compounds having active hydrogen atoms such as polymerizable unsaturated carboxylic acids, alcohols, or amines; by reacting hydroxyl groups of urethane polyols with unsaturated carboxylic acids or anhydrides thereof; and by reacting carboxyl groups of urethane resins with ethylenically unsaturated epoxides. For example ethylenically unsaturated urethanes may be prepared from the reaction of an isocyanate with a hydroxyalkyl(meth)acrylate." ('003 patent, column 3, lines 35-49).

The '003 patent therefore discloses the addition of a diisocyanate to a hydroxyalkyl (meth)acrylate alone, but not to a preblend of an oligoester and a hydroxyalkyl (meth)acrylate.

The '003 patent also discloses Examples 3-6 which include a urethane acrylate resin. The footnotes to these examples disclose the ingredients used to prepare each urethane acrylate resin, but fail to disclose how the urethane acrylate resins were prepared.

## **2. Rejection of Claims 1-3, 5-21, and 26 as Being Obvious Over the '003 Patent**

Claims 1-3, 5-21, and 26 would not have been obvious over the '003 patent for the same reasons that the present claims would not have been obvious over the '613 patent, as discussed above. The '003 patent discloses a different method of preparing a urethane acrylate gel coat resin, as set forth at column 3, line 35 through column 4, line 10. This method is identical to the method disclosed in the '613 patent, and yields the same product as the '613 patent.

As discussed above, the present claims recite a particular order of addition that differs from the '613 and '003 patents, and yields a different urethane acrylate gel coat resin.

The '003 patent also discloses urethane acrylate resins in Examples 3-5. These resins differ from the claimed urethane acrylate gel coat resins (e.g., the resin of the '003 patent is prepared from a polypropylene glycol/ethylene oxide ether). Moreover, the '003 patent fails to teach or suggest how these resins were prepared.

For all the reasons set forth above with respect to the nonobviousness of the claims over the '613 patent, appellants submit that claims 1-3, 5-21, and 26 would not have been obvious to a person skilled in the art under 35 U.S.C. §103 over the '003 patent, and that the rejection should be reversed.



**F. REJECTION OF CLAIMS 1-3 AND 5-27 AS BEING OBVIOUS OVER THE '003 PATENT IN VIEW OF THE '837 PATENT**

**1. Rejection of Claims 1-3 and 5-27 as Being Obvious Over the '003 Patent in View of the '837 Patent**

The '003 and '837 patents have been discussed above.

As previously discussed, the primary '003 patent fails to render the present claims obvious for the same reasons that the '613 patent fails to render the present claims obvious.

In addition, the reason why the secondary '837 patent does not overcome the deficiencies of the '613 patent were previously discussed. For the same reasons, the '837 patent fails to overcome the deficiencies of the '003 patent.

Further, neither the '003 patent nor the '837 patent teaches or suggests the claimed branched oligoester. The references merely disclose ethers. The references fail to teach or suggest every claimed element, and accordingly, a contention of *prima facie* obviousness cannot be sustained.

Therefore, for the reasons set forth herein, appellants submit that claims 1-3 and 5-27 would not have been obvious over the '003 patent in view of the '837 patent, and that the rejection of claims 1-3 and 5-27 under 35 U.S.C. §103 should be reversed.

**X. CONCLUSION**

In view of the foregoing remarks, appellants respectfully request that the Board reverse the final rejection of claims 1-3 and 5-27, and that all pending claims should be allowed.

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Respectfully submitted,

By 

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## **CLAIMS APPENDIX**

### **Claims on Appeal in Application Serial No. 10/521,225.**

1. (Previously presented) A urethane acrylate gel coat resin comprising reaction products of a reaction mixture comprising

(a) a branched aliphatic hydroxy-terminated oligoester having weight average molecular weight of about 200 to about 4000, wherein the branched oligoester is a reaction product of

(i) one or more saturated diols;

(ii) one or more saturated triols, and

(iii) one or more saturated dicarboxylic acids, or one or more aliphatic unsaturated dicarboxylic acids, or one or more saturated dicarboxylic acid anhydrides, or one or more aliphatic unsaturated dicarboxylic acid anhydrides, or mixtures thereof,

wherein the oligoester comprises up to 5 mole % of the one or more saturated triols;

(b) a diisocyanate; and

(c) a hydroxyalkyl (meth)acrylate,

wherein the reaction mixture is formed by adding the diisocyanate to a blend of the oligoester and hydroxyalkyl(meth)acrylate.

2. (Previously presented) The gel coat resin of claim 1 comprising a compound having a structure



wherein A is the oligoester, B is the diisocyanate, and C is the hydroxyalkyl (meth)acrylate.

3. (Original) The resin of claim 1 wherein the oligoester is saturated or unsaturated and has a weight average molecular weight of about 500 to about 3000.

4. (Cancelled)

5. (Previously presented) The gel coat resin of claim 1 wherein the diol and triol are selected from the group consisting of 1,6-hexanediol, neopentyl glycol, glycerol, trimethylolpropane, 1,3-butylene glycol, 1,4-butylene glycol, cyclohexanedimethanol, ethylene glycol, propylene glycol, pinacol, pentanediol, 2,2-dimethyl-1,3-propanediol, a polyethylene or polypropylene glycol having a weight average molecular weight of about 500 or less, and mixtures thereof.

6. (Original) The gel coat resin of claim 5 wherein the dicarboxylic acid is selected from the group consisting of adipic acid, maleic acid, malonic acid, cyclohexanedicarboxylic acid, sebacic acid, azelaic acid, succinic acid, glutaric acid, pimelic acid, suberic acid, chlorosuccinic acid, maleic acid, dihydroxymaleic acid, diglycollic acid, oxalacetic acid, oxalic acid, pimelic acid, suberic acid, chlorosuccinic acid, mesoxalic acid, acetone dicarboxylic acid, dimethyl malonic acid, 1,2-cyclopropanedicarboxylic acid, cyclobutane-1,1-dicarboxylic acid, cyclobutane-1,2-dicarboxylic acid, cyclobutane-1,3-dicarboxylic acid, cyclopentane-1,1-dicarboxylic acid, cyclopentane-1,2-dicarboxylic acid, 2,5-dimethylcyclopentane-1,1-dicarboxylic acid, alpha,alpha'-di-sec-butylglutaric acid, beta-methyl-adipic acid, isopropyl-succinic acid, and 1,1-dimethyl-succinic acid, anhydrides thereof, and mixtures thereof.

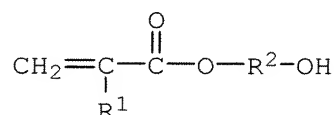
7. (Original) The gel coat resin of claim 1 wherein a reaction mixture of (a), (b), and (c) contains a molar ratio of about 0.75 to about 1.25 mole (a) to about 1.5 to about 2.5 moles (b) to about 1.5 to about 2.5 moles (c).

8. (Original) The gel coat resin of claim 1 wherein the diisocyanate comprises (a) an aliphatic diisocyanate and (b) up to 20% of an aromatic diisocyanate, by total weight of the diisocyanate.

9. (Original) The gel coat resin of claim 8 wherein the aliphatic diisocyanate is selected from the group consisting of 1,6-hexamethylene diisocyanate, isophorone diisocyanate, 1,4-cyclohexane diisocyanate, 2,4'-dicyclohexylmethane diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, 1,3-bis(isocyanatomethyl)cyclohexane, 1,4-bis(isocyanatomethyl)cyclohexane, tetramethylxylylene diisocyanate, 1,11-diisocyanatoundecane, 1,12-diisocyanatododecane, 2,2,4-trimethyl-1,6-diisocyanatohexane, 2,4,4-trimethyl-1,6-diisocyanatohexane, 1,2-bis(isocyanatomethyl)cyclobutane, hexahydro-2,4-diisocyanatotoluene, hexahydro-2,6-diisocyanatotoluene, 1-isocyanato-2-isocyanatomethyl cyclopentane, 1-isocyanato-3-isocyanatomethyl-3,5,5-trimethyl cyclohexane, 1-isocyanato-4-isocyanatomethyl-1-methyl cyclohexane, 1-isocyanato-3-isocyanatomethyl-1-methyl cyclohexane, and mixtures thereof.

10. (Original) The gel coat resin of claim 9 comprising 0% to about 20%, by total weight of the diisocyanate, of an aromatic diisocyanate selected from the group consisting of toluene 2,4-diisocyanate, toluene 2,6-diisocyanate, 4,4'-methylenediphenyl diisocyanate, 2,4'-methylene diphenyl diisocyanate, polymeric methylene diphenyl diisocyanate, p-phenylene diisocyanate, naphthalene-1,5-diisocyanate, and mixtures thereof.

11. (Original) The gel coat resin of claim 1 wherein the hydroxyalkyl (methyl)acrylate has a structure



wherein R<sup>1</sup> is hydrogen or methyl and R<sup>2</sup> is a C<sub>1</sub> to C<sub>6</sub> alkylene group or an arylene group.

12. (Original) The gel coat resin of claim 1 wherein the hydroxyalkyl (meth)acrylate is selected from the group consisting of 2-hydroxyethyl methacrylate, 2-hydroxyethyl acrylate, 2-hydroxypropyl methacrylate, 3-hydroxypropyl methacrylate, and mixtures thereof.

13. (Original) The gel coat resin of claim 1 wherein the oligoester comprises a reaction of product of (a) neopentyl glycol, 1,6-hexanediol, or a mixture thereof, and (b) adipic acid.

14. (Original) The gel coat resin of claim 13 wherein the diisocyanate

comprises isophorone diisocyanate.

15. (Original) The gel coat resin of claim 14 wherein the hydroxyalkyl (meth)acrylate comprises 2-hydroxyethyl acrylate.

16. (Original) A gel coat composition comprising a urethane acrylate gel coat resin of claim 1.

17. (Original) The gel coat composition of claim 16 wherein the gel coat resin is present in the composition in an amount of about 25% to about 50%, by weight, of the composition.

18. (Original) The gel coat composition of claim 16 further comprising a pigment paste, a free radical initiator, or a mixture thereof.

19. (Original) A gel coat prepared by curing a gel coat composition comprising a urethane acrylate gel coat resin of claim 1.

20. (Original) The gel coat of claim 19 wherein the gel coat is prepared by a free radical polymerization.

21. (Original) An article of manufacture having an exterior gel coat prepared by curing a gel coat composition comprising a urethane acrylate gel coat resin of claim 1.

22. (Previously presented) A method of preparing a urethane acrylate gel coat resin comprising the steps of

(a) preparing a branched hydroxy-terminated oligoester having a weight average molecular weight of about 200 to about 4000 by reacting

(i) one or more saturated diols;

(ii) one or more saturated triols, and

(iii) one or more saturated dicarboxylic acids, or one or more aliphatic unsaturated dicarboxylic acids, or one or more saturated dicarboxylic acid anhydrides, or one or more aliphatic unsaturated dicarboxylic acid anhydrides, or mixtures thereof,

wherein the oligoester comprises up to 5 mole % of the one or more saturated triol;

(b) adding a hydroxyalkyl (meth)acrylate to the oligoester of step (a) to form a prereaction mixture;

(c) then adding a diisocyanate to the prereaction mixture of step (b) to form a reaction mixture; and

(d) maintaining the reaction mixture of step (c) at a sufficient temperature for a sufficient time such that equivalents of free isocyanate groups are present at less than 0.3% of the isocyanate groups added in step (c) to yield the urethane acrylate gel coat resin.

23. (Previously presented) The method of claim 22 wherein the gel coat resin has an acrylate group positioned at terminal ends of the resin.

24. (Original) The method of claim 23 wherein the gel coat resin is prepared using a molar ratio of (I) oligoester to (II) diisocyanate to (III) hydroxyalkyl (meth)acrylate of about 0.9 to about 1.1 (I) to about 1.5 to about 2.2 (II) to about 1.5 to about 2.2 (III).

25. (Original) The method of claim 23 wherein the gel coat resin is prepared using a mole ratio of oligoester to diisocyanate to hydroxyalkyl (meth)acrylate of

1:1.7-2:1.7-2, respectively.

26. (Previously presented) The gel coat resin of claim 1 wherein the oligoester comprises about 1.4 mole % up to 5 mole % of the one or more saturated triols.

27. (Previously presented) The method of claim 22 wherein the oligoester comprises about 1.4 mole % up to 5 mole % of the one or more saturated triols.



## **EVIDENCE APPENDIX**

None.

## **RELATED PROCEEDINGS APPENDIX**

There are no related proceedings.